

## REMARKS ON SOME AUSTRALIAN CESTODARIA.

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### Order AMPHILINIDEA.

In November, 1932, Ihle and Ihle-Landenberg described an Amphilinid cestode, *Kosterina kuiperi*, n.g., n.sp., from the lung cavity of an Australian tortoise, *Chelodina longicollis* (Shaw), from the Rotterdam Zoological Garden. They regarded it as the representative of a new subfamily, Kosterininae (Amphilinidae). Early in 1931 there was described *Austramphilina elongata* from the body cavity of the same species of tortoise from Lake Macquarie, New South Wales (Johnston, 1931). The parasite obviously belongs to the same species as Ihle's, so that *Kosterina* must be regarded as a synonym of *Austramphilina* and Kosterininae accordingly becomes Austramphilininae. I did not have material available for sectioning, but Ihle has published figures of several sections. The two accounts differ in very few particulars.

Ihle stated that the worms were taken from the lung cavity, whereas mine were obtained from the coelome in the vicinity of the ovary, the parasites in their rounded, greatly contracted, condition, being at first mistaken by Mr. Filmer, their discoverer, for eggs. All other known Amphilinids live normally in the body cavity of some fish, hence Ihle's material may have invaded the lung, perhaps damaged during the dissection. There is another possible explanation. *Amphilina* occurs in the body cavity of sturgeons and its eggs probably reach the exterior through the abdominal pores of the fish. In the case of *Gephyrolina paragonopora*, which infests the coelome of some Indian Siluroids (*Macrones* spp.), in which such pores are absent, Woodland (1923) has stated that the parasite is able by means of its rostellum and anterior boring apparatus, to make its way through the body wall and thus reach the exterior. Perhaps *Austramphilina*, with its weaker rostellum and less strongly developed glandular apparatus, can readily penetrate the thin-walled lungs and thus allow its eggs to escape through the rostellar cavity into the respiratory apparatus of the tortoise and reach the water, where, presumably, some crustacean serves as an intermediate host.

Ihle reported the absence of a rostellum and did not find frontal glands, but my material indicates the presence of the former, its appearance, when retracted, being figured in the original account and resembling that of other Amphilinids. In Ihle's specimens, judging from the figures, the rostellum is not retracted, and this would account for his statement that the uterus opens at the anterior end, whereas in my material it opens into the rostellar cavity, near its base. Large, finely granular cells were found scattered in the parenchyma in the anterior part of the parasite and were regarded as being frontal glands, though some of them

may have been giant subcuticular cells, similar to those figured by Fuhrmann (1930, fig. 182) for *Amphilina foliacea*. The small dorsal diverticulum at the junction of the receptaculum and vagina was not mentioned by Ihle. He emphasized the presence of a true receptaculum seminis, of relatively enormous size and developed as a widening of the vagina, this organ being absent in all other Amphilinids, its place being taken by an accessory receptaculum. The structures labelled as accessory receptacula in my figure (1931, fig. 9) are merely small swellings of the inner portion of the vagina and are not diverticula like the structures so named occurring in other Amphilinids. All the remaining features of this striking worm have been emphasized by both of us.

Poche had previously (1922) erected the family Schizochoceridae to include two subfamilies. Soon afterwards Woodland (1923) described *Amphilina paragonopora* from freshwater Siluroids from the Ganges basin, his species being made the representative of a new genus *Gephyrolina*, and subfamily Gephyrolininae, by Poche (1926a, 254-5; 1926b, 25). This Indian form was regarded as showing a number of characters intermediate between the Amphilinidae and Schizochoceridae and, as a consequence, Poche suppressed the latter and incorporated all four subfamilies—Amphilininae, Gigantolininae, Schizochocerinae, and Gephyrolininae—under Amphilinidae, and this arrangement has been accepted by Fuhrmann (1930). If the diagnosis of the order given by the latter (1930, 146-7) be accepted as that of the family, then the Austramphilininae would constitute a fifth subfamily which (apart from the disposition of its uterus) shows most affinity with the Gephyrolininae.

*A. elongata* possesses certain features similar to those of *Gephyrolina paragonopora* (Woodland, 1923), e.g., band-like form and terminal genital openings; but differs from it in the distribution and form of the testes; the presence of a true receptaculum in *Austramphilina* and its absence in the other, where it is replaced by an accessory receptaculum; and especially in the course of the uterus, a feature in which *Austramphilina* differs most widely from all other members of the order. In view of the outstanding features presented by this parasite, it seems advisable to retain the family rank—Austramphilinidae—assigned to it in 1931, and an amplification of the diagnosis is now made: Amphilinidea with band-like form; terminal limb of uterus median, posteriorly-directed limb lateral on the side opposite from the first ascending limb; testes scattered in a dorsal and a ventral layer above and below the uterus; male and vaginal apertures at the posterior end and opening into a short genital atrium; penis absent; very large receptaculum formed as a widening of the vagina.

As mentioned in the earlier accounts, the host relationship is noteworthy, since all the remaining known genera occur in bony fish, whereas *Austramphilina* is a parasite of a freshwater Chelonian.

#### Order GYROCOTYLIDEA.

In their paper, Ihle and Ihle-Landenburg (1932, 316) stated that no Cestodaria, except *Kosterina*, were known from Australia. This is incorrect, since two species belonging to the Gyrocotylidae, viz., *Gyrocotyle rugosa* Dies. and *G. nigrosetosa* Haswell, have been recorded from our waters.

#### GYROCOTYLE RUGOSA Dies.

This parasite was first recorded from the Commonwealth by Spencer (1889), who gave a detailed account under the name *Amphiptyches urna* Grube and Wagener, the host being the elephant fish, *Callorhynchus antarcticus* Lacep., from



Victorian waters. In 1902 Haswell referred to it as *G. rugosa* and gave a few figures, but did not mention any locality. He may have collected it at Dunedin, New Zealand, where the host is common and where he frequently spent his summer vacations. I have identified the species from the same host species in Tasmania, as well as from Encounter Bay, South Australia; the latter material having been collected by my colleague, Professor J. B. Cleland. This parasite is widely distributed in the Southern Ocean. It has been recorded by Monticelli (1889, 323; 1890, 327) from *C. antarcticus* from Dunedin; by Diesing (1850, 408) from Valparaiso, where it was said to have been found in a mollusc, *Macra edulis* King (= *Mulinia edulis*, see Dollfus, 1923, 216 and fig. 1); and from Natal, where it was said to have been taken from a gazelle. The latter record is obviously incorrect and is no doubt due to a misplacing of labels; whereas that relating to the mollusc is probably based on a specimen which was voided by *Callorhynchus* and became accidentally enclosed by the *Mulinia*. Efforts to infect bivalves with embryos of *Gyrocotyle* have, so far, been unsuccessful. The record of the species from a South African sheep by Linstow in 1901 must also be a mistake due to incorrect labelling, as Dollfus and Fuhrmann have inferred.

In 1910, Hungerbuehler recorded the presence of the parasite in *C. antarcticus* from South Africa. In 1924, Linton described a new species, *Gyrocotyle plana*, from the same Chimaeroid from Table Bay. It is strikingly like *G. rugosa*, from which it was stated to differ in possessing a uterus with an axis and lateral diverticula and in having the genital apertures placed more like those of *G. urna*. The species was said to show little resemblance to *G. fimbriata*. The two latter are regarded by Dollfus (1923) as synonyms, though Fuhrmann (1930) retains them as distinct. It seems to me that *G. plana* is a synonym of *G. rugosa*, being based on a strongly contracted specimen.

The host is variously named in literature relating to Australasian fish, though *C. antarcticus* Lacep. is the term most commonly employed. Waite in his illustrated catalogue of the fishes of South Australia (*Rec. South Austr. Mus.*, 2 (1), 1921, 35) calls it *C. milii* Bory 1823, as also do Lord and Scott in their "Synopsis of the vertebrate animals of Tasmania" (1924, 30). McCulloch (Commonwealth Fisheries, Endeavour Reports, 1, 1911, 16) refers to it as *C. callorhynchus* L., as also did Waite (*Rec. Canterbury Museum*, 1 (2), 1909, 23). Dollfus (1923, 228) states that *C. callorhynchus* L. is the same as *Chimaera monstrosa* L., and, if so, then the Linnaean name cannot apply to the southern Chimaeroid. McCulloch in his check-list (1929, 32) definitely identifies the fish as *C. milii* Bory, with *C. tasmanius* Richardson and *C. dasycaudatus* Colenso (from New Zealand) as synonyms. The remaining Australian Chimaeroids are *Chimaera ogilbyi* Waite from New South Wales and Tasmania, and *C. waitei* Fowler from Victoria.

Haswell (1902, 48) referred to the presence of *Gyrocotyle* "not only in the northern *Chimaera monstrosa*, but (also) in the southern *Callorhynchus antarcticus* and *C. argenteus*". Dollfus (1923, 228) pointed out that the latter name is a synonym of *Chimaera monstrosa*. Hutton in his "Index Faunae Novae-Zelandiae" (1904, 53) listed *C. antarcticus*, as well as *Chimaera monstrosa* var. *australis* Hector, as occurring in the waters of the Dominion, and *Gyrocotyle urna* (based on Spencer, 1889) is recorded (p. 310) among the cestodes. Phillips in his check-list of the fishes of New Zealand (*Jour. Pan-Pacific Research Institution*, 2 (1), 1927, p. 11) includes *Chimaera nova-zelandiae* Fowler (as a rare species) and *Callorhynchus milii*. It is probable, then, that Haswell's "*C. argenteus*" may

be the same as Hector's variety of *Chimaera monstrosa* or *Chimaera novae-zelandiae*.\*

GYROCOTYLE NIGROSETOSA Haswell.

This species was described by Haswell (1902) from *Chimaera ogilbyi* Waite, obtained at Manly, New South Wales. It was stated to be more nearly related to *G. urna* than to *G. rugosa*. A comparison of Haswell's figure with that recently published by Ruzskowski (1932, Pl. 41, f. 1) for *G. urna*, suggests that *G. nigrosetosa* is a synonym of the latter, which is known to be very variable in the form of its rosette and in the folding of its lateral margins. Ruzskowski's work appears to have settled the vexed question of the orientation of *Gyrocotyle*, as he found the larval hooklets lying at the end from which the rosette was developing. The rosette end is thus the posterior, as was believed to be the case by Haswell, Kofoid, Watson, Woodland (1923) and others, a view which was opposed by Spencer, Dollfus, Fuhrmann and other distinguished parasitologists.

GYROCOTYLE URNA Grube and Wagener.

It has been pointed out that Spencer's account of *Amphiptyches urna* from Victoria was based on *Gyrocotyle rugosa*. *G. urna* has not been recorded from Australian waters, but assuming my view regarding the synonymy of *G. nigrosetosa* to be correct, then *G. urna* occurs in *Chimaera ogilbyi*. I have identified a solitary specimen taken by Professor Cleland from *Callorhynchus* at Encounter Bay, South Australia, as *G. urna*. It closely resembles the figures published by Scott (1911), Watson (1911, as *G. fimbriata*), Dollfus (1923) and Fuhrmann (1930). Hungerbuehler recorded *G. urna* from *Callorhynchus* from South Africa in 1910.

The Cestodaria now known to occur in Australia are as follows:

Host.	Parasite.	Locality.
<i>Chelodina longicollis</i> ....	<i>Austramphilina elongata</i> Johnston. (Syn. <i>Kosterina kuiperi</i> Ihle.)	New South Wales.  Australia.
<i>Chimaera ogilbyi</i> .....	<i>Gyrocotyle urna</i> Gr. and Wag. (Syn. <i>G. nigrosetosa</i> Haswell.)	New South Wales.
<i>Callorhynchus milii</i> .....	<i>Gyrocotyle rugosa</i> Dies. (Syn. <i>Amphiptyches</i> <i>urna</i> Spencer, nec Gr. and Wag.; <i>G. plana</i> Linton.)  <i>Gyrocotyle urna</i> Gr. and Wag. (nec Spencer, 1889).	Victoria, Tasmania, S. Australia.  S. Australia.

\* Since this paper was submitted for publication, Mr. G. P. Whitley, Ichthyologist, Australian Museum, Sydney, in response to inquiries, has forwarded the following information. *Callorhynchus milii* Bory de St. Vincent is the correct name for the species inhabiting the Australian and New Zealand seas, with *C. antarcticus* Schinz 1822 as a synonym. Lacepede's description is based on a South American form, probably distinct. *Chimaera callorhynchus* L. 1758 is the South African species (= *Callorhynchus callorhynchus*), the name being wrongly applied by earlier authors to the Australasian



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"elephant fish". Dollfus' reference (1923) to the synonymy of *C. argenteus* is incorrect, the latter name being given by Philippi to a South American *Callorhynchus*. *Chimaera waitei* Fowler 1907 (= *Hydrolagus waitei*) is perhaps not distinct from *C. ogilbyi* Waite. Hutton's variety, *australis*, is a valid species, now known as *Phasmichthys novaezelandiae* (Fowler 1910), the former name being preoccupied.